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10/589,411	11/15/2006	Yoshihiro Naruse	TIP-06-1204	7152
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EXAMINER MATZEK, MATTHEW D				
ART UNIT		PAPER NUMBER		
1786				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pto.phil@dlapiper.com

Office Action Summary

Application No.

10/589,411

Applicant(s)

NARUSE ET AL.

Examiner

MATTHEW D. MATZEK

Art Unit

1786

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 132-134 and 136-150 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 132-134 and 136-150 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2006 and 17 May 2010 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsman's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Response to Amendment

1. The amendment dated 5/7/2010 has been fully considered and entered into the Record. Claim 135 has been incorporated into claim 132. Claims 1-31, 135 and 151-157 have been cancelled. Amended claim 132 contains no new matter. Claims 132-134 and 136-150 remain active. The previous objection to the drawings has been withdrawn due to the submission of a replacement drawing.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 132-134 and 136-150 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. (US 2003/0106294 A1).

a. Chung et al. disclose nanofiber structures that may be used in filtering (abstract).

The structures may include a random distribution of fine polymer fibers having diameters of less than 200 nanometers [0006]. The most preferred fiber size set forth in Chung et al. provides for nanofibers ranging from 50 to 500 nanometers. This diameter range clearly falls within the claimed diameter range [0012]. The disclosure of Chung et al.

provides for a layer of fibers ranging in diameter from 50 to 500 nanometers without being blended with fibers of larger diameter. The polymer nanofibers may be formed via melt-spinning and be made of Nylon 6 [0004,8]. The random distribution of nanofibers forms a mat and may be adhered to a supporting substrate [0013]. This fine fiber mat may have a thickness of up to 100 times the fiber's diameter, yielding mats of up to 50 microns [0025]. The basis weight of the mat may be as low as 0.1 g/m^2 . The space between fibers may range from 0.1 to about 10 microns [0006]. A coarse fiber layer of Chung et al. may have a permeability as low as $1.67 \text{ cc/cm}^2/\text{sec}$ [0058, conversion done by Examiner], therefore the fine fiber layers would necessarily meet the claimed permeability as fine fiber layers of a filter have smaller pores leading to lower permeabilities when compared to coarse fiber layers.

b. The applied reference fails to provide what percentage of the nanofibers is in the sum Pa of single fiber ratios or the index of Pb; functions discussed in the specification by Applicant to describe uniformity in nanofiber diameter. The nanofiber diameters as well as the percentage of the nanofibers that are of a given diameter are both result-effective variables affecting the permeability, filter efficiency and effectiveness of the overall filter mat. Finer fibers will filter out smaller particulates than coarser fibers and uniformity in fiber diameter provides increased uniform filter performance across and through filter media. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed sum Pa of single fiber ratios, index Pb of single fiber diameters, as well as the fiber diameters themselves, it would have been obvious to one of ordinary skill in the art to optimize these result-

effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

c. The freeness of the nanofiber mat as well as the average pore area and density are relative result-effective variables affecting permeability of the nanofiber mat. Decreasing freeness values as well as average pore area size increases the effectiveness of the filter by preventing the passage of ever smaller particles. An increase in density also leads to an increase in effectiveness of the filter in that there is less open space for particles to pass through. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed freeness, density and average pore size, it would have been obvious to one of ordinary skill in the art to optimize these result-effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

d. Claim 141 is rejected as the fine fiber filter of Chung et al. has holes (pores) ranging from 0.01 to 25 microns [0006] therefore, the applied article would have zero holes with a diameter of 50 microns or more per cm². Claim 143 is rejected as the nanofibers may be made of Nylon 6, a polyamide, which has a melting point of 216°C. The fine fiber layer may be blended with other fibers [0014] and as discussed previously the diameter of the fibers used as well as the percentage of fibers of a given diameter are result-effective variables affecting the permeability, filter efficiency and effectiveness of the overall filter mat. Finer fibers will filter out smaller particulates than coarser fibers, but coarser fibers provide stability to the fine fiber layer. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the

claimed fiber diameters as well as their representation on percentage basis in the layer, it would have been obvious to one of ordinary skill in the art to optimize these result-effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

e. Claim 142 is rejected as the smoothness of the nanofiber layer of Chung et al. is a result-effective variable affecting the ability of the media being filtered to pass through the filter. Higher smoothness levels provide for less friction between fluid and filter causing a lower pressure drop through the filter, which extends the lifetime of the filter. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the smoothness, it would have been obvious to one of ordinary skill in the art to optimize this result-effective variable by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

f. Claims 147-149 and 151-155 are rejected as the fine fiber layer may be laminated to conventional filter media [0061] such as woven or non-woven substrates (claim 121) and may serve as a compound synthetic paper, filter, separator, abrasive or part of a medical product or circuit board.

g. Claim 150 is rejected as it would have been obvious to one of ordinary skill in the art at the time of the invention to have molded the fine fiber layer to fit within a filtering apparatus. This is easily done since the fibers are made of a thermoplastic polymer.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 132-136, 138-140, 142, 145, 146 and 150 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. 11/587,128.

a. Although the conflicting claims are not identical, they are not patentably distinct from each other because the applied reference fails to provide what percentage of the nanofibers are in the sum Pa of single fiber ratios or the index of Pb; functions discussed in the specification by Applicant to describe uniformity in nanofiber diameter. The nanofiber diameter as well as what percentage of the nanofibers are of a given diameter are result-effective variables affecting the permeability, filter efficiency and effectiveness of the overall filter mat. Finer fibers will filter out smaller particulates than coarser fibers and uniformity in fiber diameter provides increased uniform filter performance across

and through filter media. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed sum Pa of single fiber ratios, index Pb of single fiber diameters, as well as the fiber diameters themselves, it would have been obvious to one of ordinary skill in the art to optimize these result-effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Claims 135, 139, 140, 142, 145, 146 and 150 are obvious over application '128 for the same reasons as set forth in the Chung et al. rejection.

b. The article of the '128 application may be used in the manner set forth in claims 151-155. Claims 136 and 138 are rejected as it would have been obvious to one of ordinary skill in the art to have selected a basis weight and density within the claimed ranges since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. Claims 132-135, 139, 140, 142, 145-147, 149 and 150 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4, 7-10, 12-16 and 35 of copending Application No. 11/578,926.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the applied reference fails to provide what percentage of the nanofibers are in the sum Pa of single fiber ratios or the index of Pb; functions discussed in the specification by Applicant to describe uniformity in nanofiber diameter. The

nanofiber diameter as well as what percentage of the nanofibers are of a given diameter are result-effective variables affecting the permeability, filter efficiency and effectiveness of the overall filter mat. Finer fibers will filter out smaller particulates than coarser fibers and uniformity in fiber diameter provides increased uniform filter performance across and through filter media. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed sum Pa of single fiber ratios, index Pb of single fiber diameters, as well as the fiber diameters themselves, it would have been obvious to one of ordinary skill in the art to optimize these result-effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Claims 135, 139, 140, 142, 145, 146 and 150 are obvious over application '926 for the same reasons as set forth in the Chung et al. rejection. The article of the '926 application may be used in the manner set forth in claims 151-155.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 132-135, 144, 145, 146 and 150 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1-16 of U.S. Patent 7,666,504.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the applied reference fails to provide what percentage of the nanofibers are in the sum Pa of single fiber ratios or the index of Pb; functions discussed in the specification by Applicant to describe uniformity in nanofiber diameter. The nanofiber diameter as well as what percentage of the nanofibers are of a given diameter

are result-effective variables affecting the permeability, filter efficiency and effectiveness of the overall filter mat. Finer fibers will filter out smaller particulates than coarser fibers and uniformity in fiber diameter provides increased uniform filter performance across and through filter media. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed sum Pa of single fiber ratios, index Pb of single fiber diameters, as well as the fiber diameters themselves, it would have been obvious to one of ordinary skill in the art to optimize these result-effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Claim 150 is obvious over application '606 for the same reasons as set forth in the Chung et al. rejection. The article of the '606 application may be used in the manner set forth in claims 151-155.

6. Claims 132-135, 139, 140, 142, 143-150 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, 7, 8, 10-12, 16-19, 53, 56, 57 and 59 of copending Application No. 10/532,082.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the applied reference fails to provide what percentage of the nanofibers are in the sum Pa of single fiber ratios or the index of Pb; functions discussed in the specification by Applicant to describe uniformity in nanofiber diameter. The nanofiber diameter as well as what percentage of the nanofibers are of a given diameter are result-effective variables affecting the permeability, filter efficiency and effectiveness of the overall filter mat. Finer fibers will filter out smaller particulates than coarser fibers and uniformity in fiber diameter provides increased uniform filter performance across

and through filter media. Consequently, absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed sum Pa of single fiber ratios, index Pb of single fiber diameters, as well as the fiber diameters themselves, it would have been obvious to one of ordinary skill in the art to optimize these result-effective variables by routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Claims 135, 139, 140, 142, 145, 146 and 150 are obvious over application '926 for the same reasons as set forth in the Chung et al. rejection. The article of the '926 application may be used in the manner set forth in claims 151-155.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

7. Applicant's arguments filed 5/17/2010 have been fully considered but they are not persuasive.

8. Applicant argues that the article of Chung comprises both microfibers and nanofibers resulting in a product having a random distribution of fibers to form an interlocking net. Applicant's nanofibers have a small diameter distribution that allows for the formation of a synthetic paper with a freeness of less than 350. Applicant asserts that the article of Chung would have a freeness of more than 350 due to the larger distribution of fiber diameters that also cause differences in average pore area and density. The most preferred fiber size set forth in Chung et al. provides for nanofibers ranging from 50 to 500 nanometers. This diameter range clearly falls within the claimed diameter range [0012]. The disclosure of Chung et al. provides for a layer of fibers ranging in diameter from 50 to 500 nanometers without being blended with fibers of larger diameter. Therefore, the fibers of Chung et al. could in fact yield a synthetic paper with a freeness of less than 350 because the homogeneously dispersed fiber diameter of Chung et al. would prevent differences in average pore area and density.

9. Applicant argues that the previously applied rejection fails to account for the homogeneity of Applicant's nanofiber distribution versus the randomness that is present in Chung et al. Examiner has pointed out that Chung et al. provide for a very narrow fiber diameter distribution in its most preferred embodiment, which would lead to a consistent degree of homogeneity and freeness as claimed.

10. Applicant argues that the freeness is not a matter of density, rather a matter of homogeneity versus randomness. Examiner has established that the fibers of Chung et al.

anticipate the claimed fiber diameters and mat formed by said nanofibers have pore sizes that also anticipate those claimed. The diameter of the nanofibers used to make a nonwoven mat of fibers directly impacts the final article's pore size, freeness, density, etc. Examiner has demonstrated that the fibers used in the applied reference anticipates the claimed nanofiber diameter range and the mat formed by said fibers has pore sizes that anticipate those claimed. Therefore, it is reasonable to conclude that the nanofiber mat of the applied reference is very similar to that which is claimed. Examiner has demonstrated why the remaining structural limitations as claimed would have been obvious to one of ordinary skill in the art at the time of the invention.

11. Applicant argues that the nanofibers of Chung et al. are electrospun, which leads to an irregular single fiber diameter. Applicant asserts that this issue has been addressed by specifying the amount of freeness of the disarranged nanofibers at 350 or less so that the nanofibers are homogenously distributed within the resulting synthetic paper. Examiner concedes that Applicant and Chung et al. have used two different nanofiber fabrication processes to arrive at their respective nanofiber articles. Applicant has failed to demonstrate why the electrospun nanofibers of Chung et al., which do anticipate the claimed nanofiber diameter range, cannot yield the claimed freeness even though there may be some diameter variation within a given nanofiber. It is suggested that Applicant amend the instant claims to reflect the nanofiber formation process set forth in the instant specification and how it would yield physically dissimilar nanofibers than those of Chung et al. This would assist in distinguishing the article of Chung et al. from that of Applicant in a more direct manner rather than the indirect method of using a property of the product formed by the different nanofibers.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW D. MATZEK whose telephone number is (571)272-2423. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571.272.1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew D Matzek/
Examiner, Art Unit 1786

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